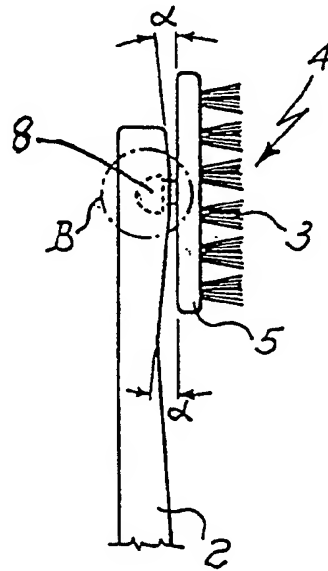


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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(54) Title:</b> TOOTHBRUSH  <b>(57) Abstract</b> <p>Toothbrush provided with a mobile bristle-holding head, comprising a bristle-holding head (4) engaged into the top end (2) of a handle by means of pins or gudgeon pins, wherein angulations are obtained between the surface of said top end (2) and the corresponding surface of the head back (5) and the bearing surfaces of said assembly means, so that the head can rotate both clock- and counterclockwise around said top end, oscillating at the same time on the rotation axis.</p> 		

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## TOOTHBRUSH

## TECHNICAL FIELD

This invention relates to a toothbrush.

More in particular, this invention relates to a toothbrush provided with a mobile bristle-holding head.

## BACKGROUND ART

Toothbrushes for dental care provided with a fixed bristle-holding head aligned with the axis of the handle are known to the art and marketed.

It is also known that in order to clean the teeth thoroughly, it is necessary to realize a movement of the bristles according to the axis of the teeth and that the toothbrushes utilized today do not allow easily this movement, as it is perpendicular to the axis of the handle.

Various solutions have been proposed to overcome this drawback. For instance, a toothbrush has been proposed whose head angulation is variable and pre-determinable relatively to the axis of the handle.

A toothbrush of this type is disclosed in the Italian patent nr. 1.205.608, granted on March 23, 1989. In this toothbrush, the arrangement and stabilization of the handle according to various angulations relatively to the bristle-holding head is obtained by means of rises integral with the handle, radially arranged around a joint and opposing radial recesses integral with either the head back or the internal wall of a tongue substantially parallel to the back of said head and integral with same, or by means

of rises integral with the head, which engage into recesses obtained in the handle. By this realization, variable and stabilized angulations can be obtained; in particular, angulations of 22.5°, 45°, 90° and 180°.

The angulation of the head relatively to the handle is chosen by hand-operating on same until the position is found which allows to exercise the maximum effort in the optimum direction for cleaning the teeth, i. e. along their longitudinal axis.

This condition can be respected as long as the inclination of the handle is kept constant during the cleaning operation. In fact, minor variations in the hand position suffice to change the inclination of the handle and therefore the position of the head relatively to an original position which has been considered as being the optimum one. This involves therefore continuous changes in the angulation of said head. Besides, the hand-adjustment of the head involves rather delicate hygiene considerations.

#### DISCLOSURE OF INVENTION

Object of this invention is to provide a toothbrush such as to allow to overcome the aforementioned drawbacks and limitations of toothbrushes provided with bristle-holding heads whose angulation is variable and predeterminable.

According to this invention, this and further objects which will be clarified by the following description are achieved by a toothbrush comprising a handle, a bristle-holding head and means for engaging the head into an end of the handle,

wherein the bristle-holding head can rotate freely, both clock- and counterclockwise, oscillating at the same time on the axis of said engagement means. said axis being perpendicular to the handle.

- The free rotatory movement of the head allows the same to arrange automatically in the optimum position relatively to the axis of the teeth in any point of the dental arch, independently on any change in the inclination of the hand or the handle, achieving therefore a very efficacious and rapid cleaning action.

- The oscillatory movement of the head allows to obtain an easier and more efficacious touch between bristles and teeth in the internal part of the dental arch, and in particular in the part concerned by upper and lower premolars and molars.

#### **BRIEF DESCRIPTION OF DRAWINGS**

The characteristics of the toothbrush subject matter of this invention will be evident from the following detailed description, wherein reference is made to the attached drawings which represent some preferred, non limitative embodiments, illustrated by way of example, wherein:

- Fig. 1 is a schematic side view of the toothbrush subject matter of this invention, with the top end of the handle assembled to the rotating and oscillating bristle-holding head;

- Fig. 2 is a schematic side view of the top ends of the non assembled handle and bristle-holding heads;

- Fig. 3 is a schematic front view, in correspondence of the bristle side, of the toothbrush subject matter of this invention;
- Fig. 4 is a schematic front view of the upper part of the handle;
- Fig. 5 is a magnified detail of the top end (A) of the handle of Fig. 2;
- Fig. 6 is a magnified detail of the engagement means (A') of the bristle-holding head of Fig. 2;
- Fig. 7 is a magnified detail of the engagement means (B) opposite to the engagement pin (B) of Fig. 1;
- Fig. 8 is a schematic view of the side opposite to the bristle site (C of Fig. 6) of the engagement pin of the rotating and oscillating head;
- Fig. 9 is a schematic view of the section of the upper part of the handle along a plane passing through the X-X line of Fig. 4; and
- Figs. 10 through 13 are details of a variant of the engagement means of the bristle-head rotating and oscillating on the top end of the handle.

Figs. 1 through 9 show a preferred embodiment of the toothbrush provided with a rotating and oscillating head, subject matter of this invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

Such toothbrush comprises a handle, preferably from rigid plastic material, provided with a top end (2) and a bris-

tle-holding head (4). Said head (4) comprises a back (5), preferably from semirigid and slightly elastic plastic material, in which bristles (3) are inserted. Said back (5) is provided, on the opposite side relatively to bristles (3) and in a position balanced and integral with said back, with a pin (8) provided with longitudinal strips (9). Said pin (8) provided with said strips (9) is mushroom-shaped. The assembly of said head (4) with the handle top end (2) is achieved by engaging said pin (8) into a recess (6) obtained on the surface (12) of said top end (2) orientated towards said head and realized during the moulding stage of the part. Said recess (6) comprises a lead-in round hole (11) whose diameter is smaller than the maximum diameter of pin (8). When pin (8) is pushed into hole (11), strips (9) bend radially just enough to allow said pin to get into said recess (6). Once pin (8) has got into recess (6), strips (9) resume their starting arrangement and base (13) of pin (8) draws up against edge (7) of recess (6), preventing the bristle-holding head (4) from unhooking. The clockwise (F1) or counterclockwise (F2) free rotation is achieved by allowing a small clearance (0.2 - 0.5 mm) between the surface of recess (6) and the peripheral surface of strips (9).

Surface (12) of the handle top end (2) is not uniformly parallel to the corresponding surface of back (5), being tapered both longitudinally above and under hole (11) and transversally at both sides of hole (11). Such taperings,

together with an angulation between base (13) of pin (8) and edge (7) of recess (6), allow head (4) to oscillate freely on the rotation axis, with angulations  $\alpha$  between said surface (12) and the corresponding surface of said back (5) and said base (13) of pin (8) and said edge (7), as shown on Figs. 1, 7 and 9. The optimum amplitude of angulations  $\alpha$  is  $2^\circ - 5^\circ$ .

Figs. 10 through 13 show a variant of the system of assembly of the bristle-holding head to the handle top end of the toothbrush subject matter of this invention. Back (5) of the bristle-holding head (5), preferably from semirigid and slightly elastic material, as specified above, comprises, in a balanced position, a gudgeon pin (18) provided, along the perimeter, with a rise (17) having a triangular transversal section, as shown on Fig. 12.

The handle top end (2), preferably from rigid plastic material, as specified above, comprises a hole (21) and a recess (19), as shown on Fig. 11. A hollow counter-gudgeon pin (16) is provided separately, whose geometrical structure allows to house in the inside, with a suitable clearance, said gudgeon pin (18). Counter-gudgeon pin (16) is provided, along its internal surface and the perimeter, with stop pegs (15) having a triangular rectangle transversal section, as shown on Fig. 10. Said hollow counter-gudgeon pin (16) is suitably made from rigid plastic material, just as the handle.

The assembly of head (5) on the handle top end (12) is

obtained by introducing, in the direction of arrow F6, gudgeon pin (18) into hole (21), and introducing then, in the opposite direction according to arrow F5, counter-gudgeon pin (16) into recess (19). In so doing, gudgeon pin (18) gets into the recess of said hollow counter-gudgeon pin (16), as shown on Fig. 13. The locking between gudgeon pin (18) and counter-gudgeon pin (16) is obtained by the clutching of said rise (17) on pegs (15). The rotatory movement of the head is ensured by leaving, also in this case, a clearance of 0.2 - 0.5 mm between the external surface of the counter-gudgeon pin (16) and the surface of the hole (21) and between the internal surface (14') of head (14) of said counter-gudgeon pin (16) and the surface (20) of said recess (19). The oscillatory movement of the head is allowed, instead, by the angulations  $\alpha$  of  $2^\circ - 5^\circ$  provided between said surface (14') and said surface (20), and, just as in the above described solution, between the taperings of surface (12) of handle top end (2) and the corresponding surface of back (5) of the bristle-holding head.

The described toothbrush may be realized in different sizes and in particular in the sizes suitable for grown-ups and children. All the corners and tips of the head and the handle are suitably rounded off and, besides, the head protrudes relatively to the handle top.

While the invention has been described with reference to some preferred embodiments, it is evident that many vari-

ants and changes may be made by those expert of the art, in the light of the above disclosure. Therefore, this invention includes all of the alternatives and changes that fall within the spirit and the protection scope of the following claims.

## C L A I M S

1. Toothbrush provided with a mobile bristle-holding head, comprising a handle, a bristle-holding head (4) and pin (8, 11, 6) or gudgeon pin (18, 14) means for engaging the head into an end (2) of the handle, characterized in that the bristle-holding head (4) rotates freely both clock- and counterclockwise, oscillating at the same time on the axis of said engagement means, said axis being perpendicular to the handle.

2. Toothbrush according to claim 1, characterized in that the means for engaging head (4) into the handle end (2) comprise a pin (8) provided with longitudinal strips (9) and integral with back (5) of said head, which pin can be pressure-inserted into a recess (6) provided on the handle end, where it is locked against an edge (7).

3. Toothbrush according to claim 2, characterized in that a clearance of 0.2 - 0.5 mm is provided between the internal surface of recess (6) and the peripheral surface of strips (9).

4. Toothbrush according to claim 2 or 3, characterized in that angulations ( $\alpha$ ) whose amplitude is comprised between  $2^\circ$  and  $5^\circ$  are obtained between base (13) of pin (8) and edge (7) of recess (6) and between the longitudinal and transversal taperings made on surface (12) of end (2) and the corresponding surface of said back (5).

5. Toothbrush according to claim 1, characterized in that the means for engaging head (4) into end (2) comprise a

gudgeon pin (18), provided along the perimeter with a rise (17) integral with back (5) of said head, which rise can be inserted into a hole (21) obtained at hend (2), and a hollow counter-gudgeon pin (16) provided in the inside with pegs (15) and introduced into a recess (19), said locking being obtained by the clutching of said rose (17) on said pegs (15).

6. Toothbrush according to claim 5, characterized in that a clearance of 0.2 - 0.5 mm is realized between the external surface of counter gudgeon pin (16) and the surface of hole (21) and between the internal surface (14') of head (14) of counter-gudgeon pin and surface (20) of recess (19).

7. Toothbrush according to claim 5 or 6, characterized in that angulation ( $\alpha$ ) whose amplitude is comprised between 2° and 5° are realized between surface (14') of head (14) and surface (20) of recess (19) and between the longitudinal and transversal taperings obtained on surface (12) of end (2) and the corresponding surface of back (5) of the bristle-holding head (4).

8. Toothbrush according to the preceding claims, characterized in that back (5) of head (4) is made from semirigid and slightly elastic plastic material and that the handle and the counter-gudgeon pin (16) are made from rigid plastic material.

1/2

Fig. 1

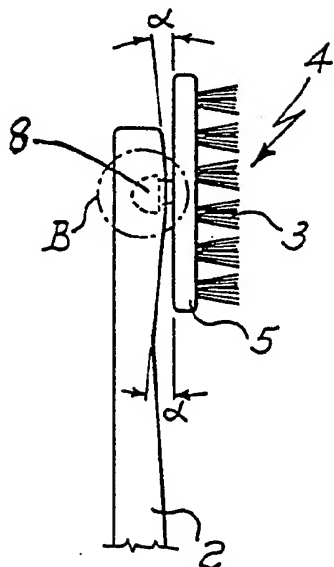


Fig. 2

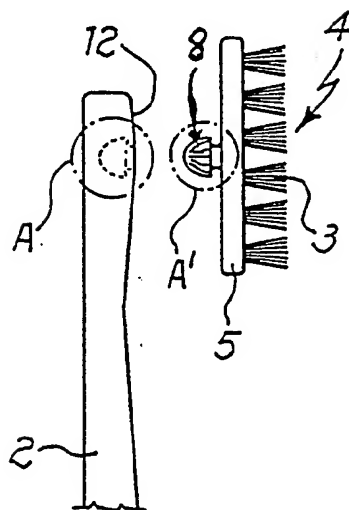


Fig. 3

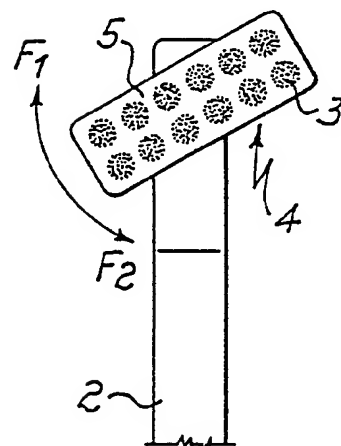


Fig. 4

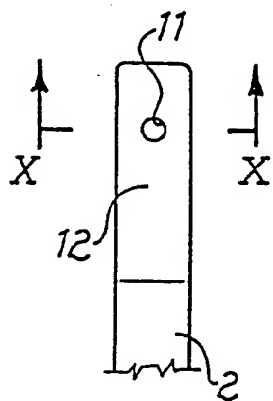


Fig. 5

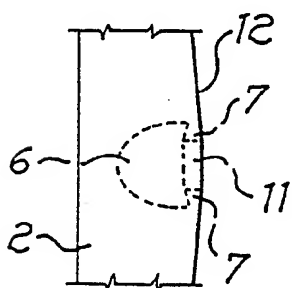


Fig. 6

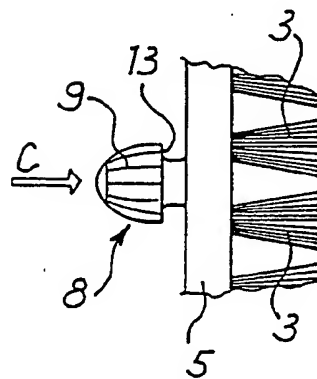


Fig. 7

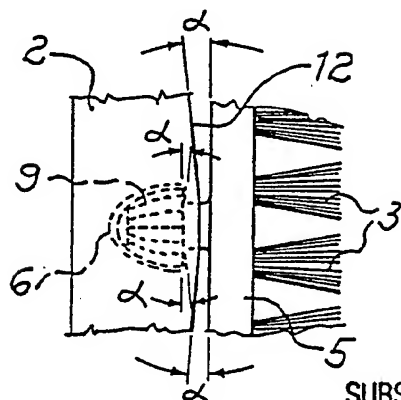


Fig. 8

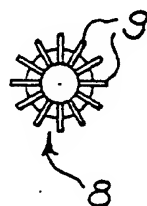


Fig. 9

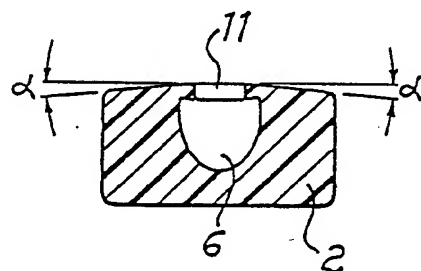


Fig. 10

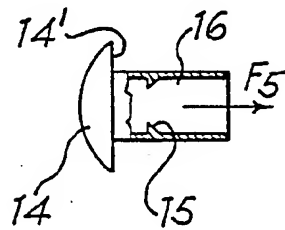


Fig. 11

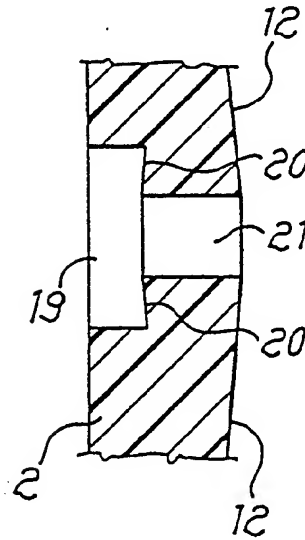


Fig. 12

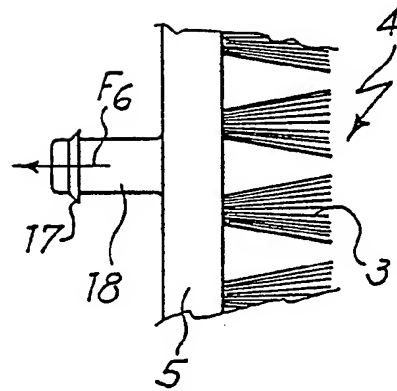
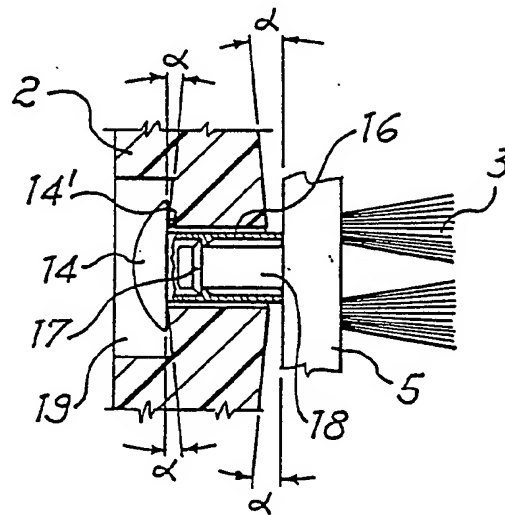


Fig. 1.3



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP 94/02070

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 A46B7/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A46B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,34 25 940 (SCHEBITZ) 23 January 1986 see the whole document ---	1-8
X	FR,A,2 446 617 (MOCCI) 14 August 1980 see claims 1,3,5 ---	1
A	US,A,4 333 199 (DEL ROSARIO) 8 June 1982 see the whole document -----	1-8

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

12 September 1994

Date of mailing of the international search report

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Information on patent family members

International application No.

PCT/EP 94/02070

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-3425940	23-01-86	NONE	
FR-A-2446617	14-08-80	NONE	
US-A-4333199	08-06-82	EP-A- 0055709 WO-A- 8102380	14-07-82 03-09-81